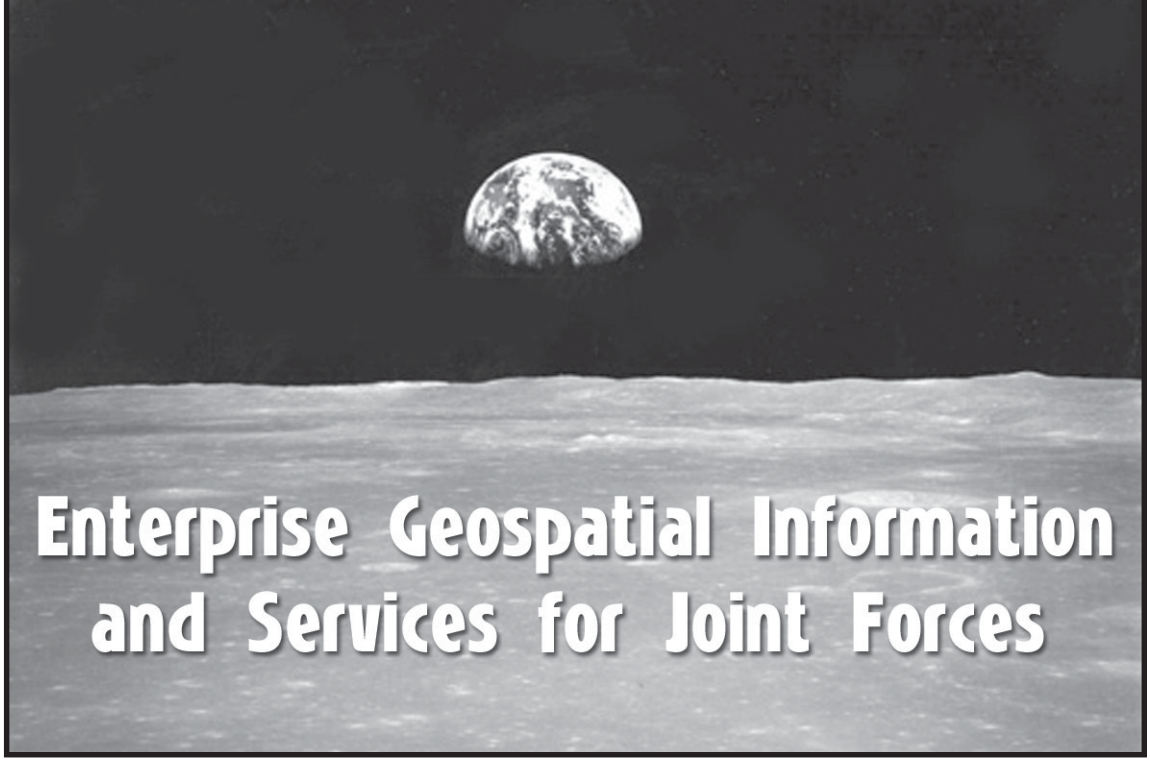


Enterprise Geospatial Information and Services for Joint Forces

Photo courtesy U.S. Geological Survey

By Colonel David A. Kingston, Chief Warrant Officer 5 Ken Tatro, and Mr. Ken Bergman

Joint Vision 2020 describes how information will enable dominant battlespace awareness as part of information superiority. Geospatial information and services form the framework for understanding the physical environment and its impact on combat operations. This article shows how joint forces and their service components use geospatial information and services, how information is provided from the national level down to platform/user level, and how that information is dynamically updated and fused at all levels. The article also discusses doctrine, organization, training, materiel, leader development, personnel, and facilities (DOTMLPF) implications to ensure that the tenets of Joint Vision 2020 are met.

Using Geospatial Information

In the Joint Vision 2020 time frame, joint forces and their components will use geospatial information for three major purposes:

- Battle command.
- Training.
- En route mission planning and rehearsal.

Also, combatant commands (primarily Joint Forces Command) use geospatial information for experimentation and combat development.

The joint command and control (JC2) capability will enable joint force commanders to exercise battle command more effectively. The JC2 Operational Requirements Document (ORD) clearly articulates the need for timely and accurate digital geospatial products. Department of Defense (DOD) battle command capabilities require geospatial data to support all aspects of command and control (C2) and intelligence, surveillance, and reconnaissance (ISR)—from planning and tasking ISR assets, deliberate C2 planning and dynamic planning/replanning on the move, execution (such as targeting and navigation), and after-action reporting. Also, the distributed common ground station requires geospatial information for analysis and fusion of the weather and the enemy portion of the common operational picture (COP).

The DOD Training Transformation Strategy revolutionizes the way joint and service component forces train. Systems will have an embedded training capability to allow users to train while en route, in-theater, and at home stations. Geospatial information is a requirement for this embedded training. Unforeseen contingencies can require rapidly generated geospatial data before deployment. Also, the Joint National Training Capability that links the major training centers and systems of each service, under development by Joint Forces Command, will not work without the required common geospatial data.

En route mission planning and rehearsal systems are simulations that warfighters will use to rehearse missions before execution. These systems require robust, accurate, and timely geospatial information.

While joint force headquarters and their components need timely and accurate geospatial data, the types of data required will vary. At the joint force headquarters level, an operational level of geospatial data is required. However, the commander and his staff must be able to "drill down" to use high-resolution geospatial information over areas of key interest and importance.

For the naval warfare component (Navy and Marine Corps), the primary focus of geospatial information is on littoral areas, bathymetry (water depths), and navigation charts. The air component is interested in aeronautical charts and vertical obstructions. The land component (Army and Marine Corps)

have the most challenging demands for geospatial information. Because the terrain has such a major impact on land combat operations, ground warfighters need much more detailed geospatial information. As potential adversaries increasingly use complex terrain and urban areas, there will be a commensurate increase in the need for detailed geospatial information. Special Operations Forces—because of their ability to operate on land, sea, and air—require the same type of data but with ultrahigh resolution and extremely timely delivery. Also, joint and service components require geospatial data for targeting. As weapons systems become more accurate, the required accuracy of geospatial data for targeting also increases.

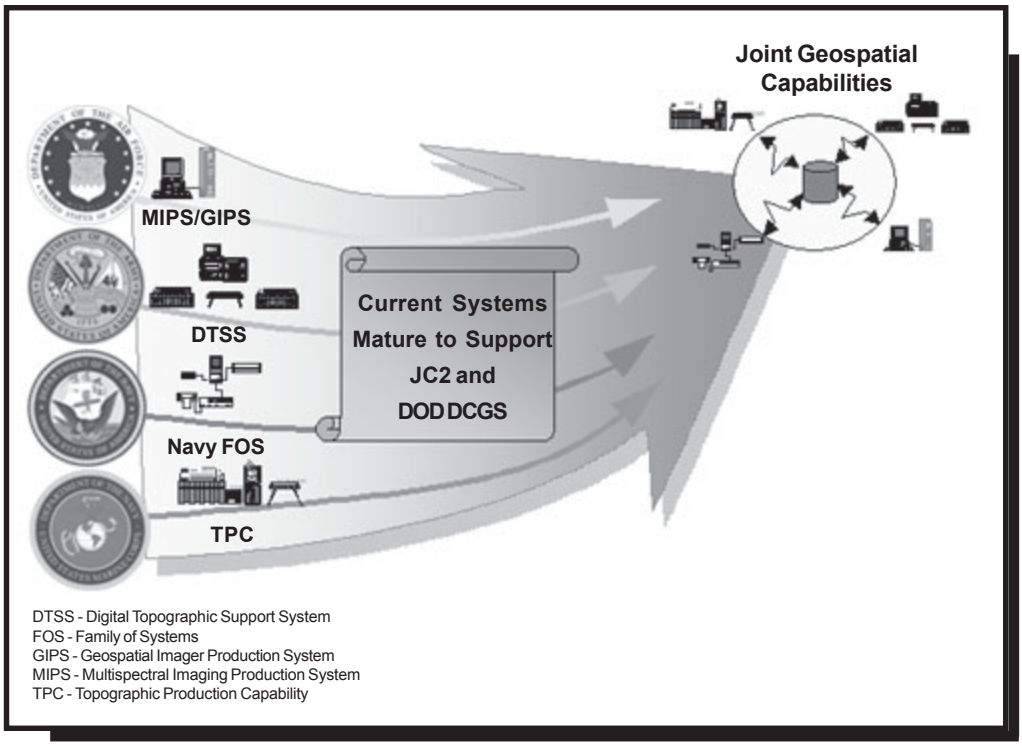
Evolving joint operations rely on service interdependence more than ever, so the lines separating the types of data each service requires are becoming blurred. The bottom line is that battlespace awareness and our ability to conduct joint operations as envisioned in Joint Vision 2020 simply cannot be accomplished without robust, accurate, and timely digital geospatial information.

Providing Geospatial Information to the User

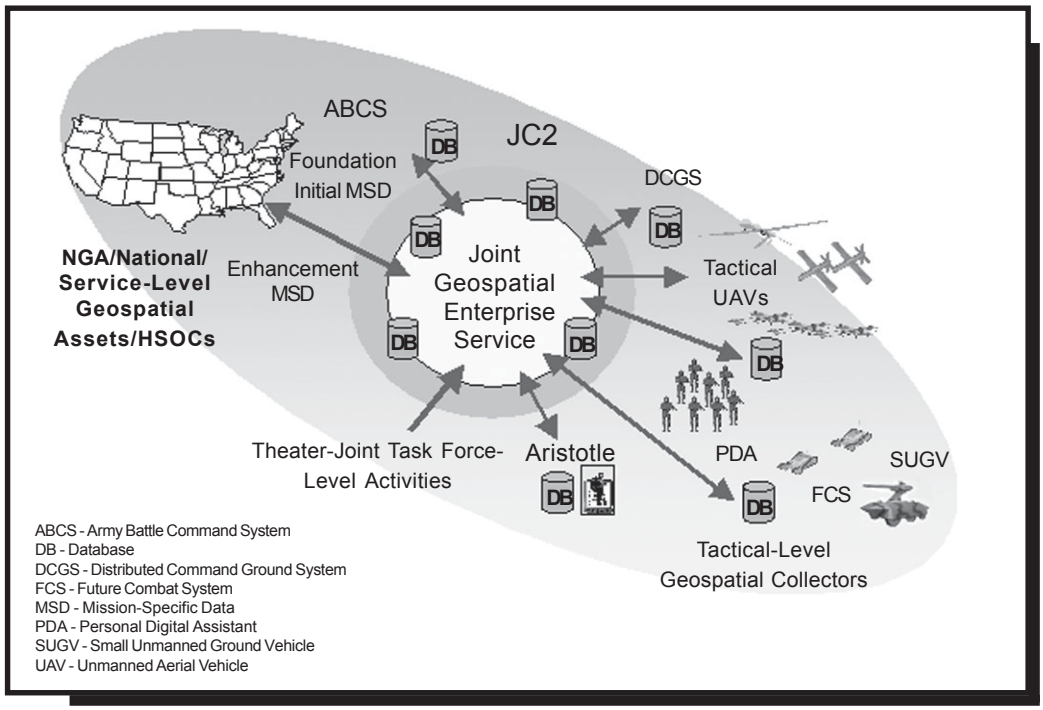
The imagery and geospatial Capstone Requirements Document (CRD) and the National System for Geospatial Intelligence ORD describe the concept and process for tasking, collecting, processing, managing, disseminating, and exploiting geospatial information to form the foundation for the COP. In the Joint Vision 2020 time period, the process will begin with a near-global foundation data set produced by the National Geospatial-Intelligence Agency (NGA). For mission planning and visualization, mission-specific data sets will be developed to provide the required level of geospatial information to the combatant commander. Additionally, NGA and the services agreed on a line of demarcation that calls for NGA to provide systems (hardware, software, and exploitation tools) and information down to combatant command level (on a case-by-case basis to the joint task force level). Beyond this line, services will provide their own systems to support their own organizations.

These service systems must comply with the requirements established in the imagery and geospatial support CRD. Thus, at component commander level and below, each service must be able to generate and manage its own geospatial information. For example, the Army must be able to rapidly generate and fuse data from multiple sensors on unmanned aerial vehicles, land vehicles, and individual soldiers.

Services will need to build some terrain data, using an enterprise (distributed) geospatial support capability over multiple sites. This will be achieved using geospatial sensor systems in the field, regional home station operations centers (HSOCs), and service-specific knowledge centers that can augment and build on the NGA foundation data to meet tactical-level needs. Geospatial data files can often be extremely large, and the processes to generate, disseminate, and update this geospatial data depend on a robust management and dissemination/communications architecture. It is envisioned that hard media such as digital video discs (DVDs) and compact discs-read only memory (CD-ROMs) will be used with high-bandwidth communications (where available) to provide the initial load of geospatial data, with radio/satellite communications to transmit updated data to platform and soldier levels.



Joint geospatial capabilities reside on the current service-based systems, and those systems mature to support joint and service-level command and control systems in a network-centric environment.



The Joint Forces Command is sponsoring a Joint Geospatial Enterprise Service to establish the standards and formats necessary for services to interoperate. This capability will evolve from current systems (DTSS, MIPS/GIPS, and TPC).

Manipulating and Fusing Geospatial Information

As missions unfold and more data becomes available, and as geospatial information changes (bridges are destroyed, buildings become rubble), databases must be automatically updated. Updates can come from all sources—from national assets to individual soldiers on the ground. Thus, each service must conduct some level of geospatial data enhancement. Data updates from services will be shared horizontally and vertically up echelons through component headquarters, to combatant commander headquarters, and up to NGA. Only updates to data sets will be distributed, to prevent resending extremely large data files. Management of these data files will be a complex operation. Failure to properly manage, conflate, and distribute data files would result in multiple differing COPs, within and between service components and joint headquarters, with potentially disastrous results.

DOTMLPF Implications

The entire DOTMLPF process must be reviewed to correct the system's deficiencies. The most glaring deficiencies appear to be in the areas of doctrine, organizational designs, and materiel solutions. Joint Publication 2-03, *Tactics, Techniques, and Procedures for Geospatial Information and Services Support to Joint Operations*—the overarching publication that covers geospatial capabilities—does not adequately address how component and joint headquarters work together to generate and manage geospatial data. Current organizational designs do not reflect how NGA support teams augment joint task force and service headquarters. Finally, there is no joint geospatial system that provides the necessary capabilities for the joint force headquarters to generate, conflate, and manage geospatial data.

Joint and component commanders require robust, accurate, and timely geospatial information for combat operations. The demand for more exact, accurate, and timely delivery of geospatial information will increase greatly as joint forces and components field increasingly capable battle command training and en route mission planning and rehearsal systems. Our current processes and systems have severe deficiencies that must be corrected if Joint Vision 2020 is to be realized.

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